

Amendments to the Specification

Please replace paragraphs 0008, 0026, 0053, 0061, 0067, 0074, and 0077 with the following amended paragraphs:

[0008] FIGS. ~~[[2A-2C]]~~ 2A-2D illustrate diagrammatic sectional representations of a sequence of rigidizing structure stiffening, relaxing, and advancement that enables guiding of the shape transferring cannula.

[0026] FIGS. 20A and ~~[[20A]]~~ 20B illustrate sectional views of a cannula structure including active material elements.

[0053] FIG. 6 illustrates a linkage embodiment of the sheath 2 in which the sheath links include a hollow central orifice 41 and pivot on spherical ball-joint like ball ~~[[46]]~~ 48 and cup 47 surfaces for two-axis pivoting. The sheath's rigidizing cable 40 runs outside each sheath 2 link's central orifice 41 allowing the assembled links to form a hollow central lumen 42 that can be occupied by the core 1 structure during cannula advancement as well as by items such as surgical instruments which the sheath lumen 42 can guide to a surgical or diagnostic site. The link's central orifice 41 has a diameter D2 that is substantially similar to diameter D1, described above.

[0061] Beginning the advancement sequence as shown in FIG. 12B, spreading the handholds 99 and 100 (core advancement handhold ~~[[100]]~~ 99 not shown for clarity) apart biases the core handle 95 (not shown for clarity) against ~~[[it's]]~~ its mechanical stop 104 in the housing 94 and rotates the sheath handle 96 on its pivot 98, first compressing the sheath rigidizing spring 106,

relaxing the sheath linkage 2, and then disengaging the sheath rack 92 from the currently-fixed core rack 91. The sheath rack 92 disengages the core rack 91 by rotating on its pivot 105 against the force of the sheath rack bias spring 113. The sheath rack 92 is rotated away from the core rack 91 by the force of the sheath rack lifter 115, which extends from the sheath handle 96, acting against the rack's lift tab 117. An initial gap between the sheath rack lifter 115 and rack's lift tab 117 allows the sheath handle 96 to rotate enough to compress the sheath rigidizing spring 106 and relax the sheath 2 before the sheath rack 92 is disengaged from the core rack 91. As illustrated in FIG. 12C, continued spreading of the actuation handles 95 and 96, with racks 91 and 92 disengaged, translates the handles apart from each other and advances the shuttle 93 and sheath 2 relative to the housing 94 and core 1.

[0067] In another embodiment of the invention, ~~FIG. 22 depicts~~ FIGS. 20A and 20B depict rigidizing structures including inner and outer concentric tubes, 221 and 222 respectively, separated by short segments of materials 223 that change shape when energized, such as electroactive polymer (EAP), which changes shape when exposed to electric fields. The inner tube 221 may or may not have an open lumen. When employing biaxially active materials such as EAP, the active material components are oriented to contract longitudinally and expand radially when energized. The active material components may be employed in a normally-non-interfering configuration or a normally-interfering configuration. In a normally-non-interfering configuration the active material components 223 are each attached to one of the concentric tubes 221 or 222 such that they do not contact the other tube, as shown in FIG. ~~[[20a]]~~ 20A, when not energized. When energized, the radial expansion of the active material components 223 causes mechanical interference with the other tube, as in FIG. ~~[[20b]]~~ 20B, thus preventing motion

between the opposed surfaces 224 and 225 and effectively locking-in the curvature of the rigidizing structure. According to the present invention, one may substitute materials that change shape when exposed to electric current, magnetic fields, light, or other energy sources. The same rigidizing effect may be achieved by replacing normally-non-interfering active material components 223 with non-interfering balloons expandable by gas or liquid fluid pressure. Alternately, such materials may be placed in a normally-interfering configuration between concentric tubes 221 and 222 such that they interfere, as in FIG. ~~[[20b]]~~ 20B when not energized and contract radially to the state depicted in FIG. ~~[[20a]]~~ 20A when energized. For example, a normally-rigid structure made stiff by normally-interfering EAP components 223 may be made flexible by applying a voltage to the EAP components such that they contract radially to the non-interfering state depicted in FIG. ~~[[20a]]~~ 20A, relieving the mechanical interference and allowing relative motion between the opposed surfaces 224 and 225 of the concentric tubes 221 and 222. Similarly, normally-interfering balloons replacing normally-interfering active material components 223 may be collapsed by applying a relative vacuum.

[0074] In another embodiment of the invention, ~~FIG. 22 depicts~~ FIGS. 20A and 20B depict rigidizing structures including inner and outer concentric tubes, 221 and 222 respectively, separated by short segments of materials 223 that change shape when energized, such as electroactive polymer (EAP), which changes shape when exposed to electric fields. The inner tube 221 may or may not have an open lumen. When employing biaxially active materials such as EAP, the active material components are oriented to contract longitudinally and expand radially when energized. The active material components may be employed in a normally-non-interfering configuration or a normally-interfering configuration. In a normally-non-interfering

configuration the active material components 223 are each attached to one of the concentric tubes 221 or 222 such that they do not contact the other tube, as shown in FIG. 20A, when not energized. When energized, the radial expansion of the active material components 223 causes mechanical interference with the other tube, as illustrated in FIG. 20B, thus inhibiting or preventing motion between the opposed surfaces 224 and 225 and effectively locking-in the curvature of the rigidizing structure. The same invention may substitute materials that change shape when exposed to electric current, magnetic fields, light, or other energy sources. The same rigidizing effect may be achieved by replacing normally-non-interfering active material components 223 with non-interfering balloons expandable by gas or liquid fluid pressure. Alternately, such materials may be placed in a normally-interfering configuration between concentric tubes 221 and 222 such that they interfere, as in FIG. 20B when not energized and contract radially to the state depicted in FIG. 20A when energized. For example, a normally-rigid structure made stiff by normally-interfering EAP components 223 may be made flexible by applying a voltage to the EAP components such that they contract radially to the non-interfering state depicted in FIG. 20A, relieving the mechanical interference and allowing relative motion between the opposed surfaces 224 and 225 of the concentric tubes 221 and 222. Similarly, normally-interfering balloons replacing normally-interfering active material components 223 may be collapsed by applying a relative vacuum.

[0077] The rigidizing structures described above as a paired system may be also employed singly as an alternately rigid and compliant support for a steerable catheter such as an endovascular catheter or flexible endoscope. In such cases as depicted in FIG. [[21]] 22, the rigidized structure provides support for the catheter to round corners without the possibility of looping because the

flexible element is advanced only when the supporting structure is rigid. Similarly, the relaxed rigidizing support is advanced only along the length of the catheter, using it as a guidewire.